```
! FINDPATTERNS on PIR:* allowing 0 mismatches

!        1 IST(G,F,K,Y,R,W)SLSLDIAL(G,F,K,Y,R,W)(A,F,K,Y,R,W)(G,F,K,Y,R,W)(G,F,K,Y,R,W)L


              RQECA  ck: 9068  len: 353   ! recombination protein recA - Escherichia co

1                    IST(G,F,K,Y,R,W)SLSLDIAL(G,F,K,Y,R,W)(A,F,K,Y,R,W)(G,F,K,Y,R,W)(G,
                       IST(G)SLSLDIAL(G)(A)(G)(G)LPM(G)RIVEIY
           41: MDVET   ISTGSLSLDIALGAGGLPMGRIVEIY   GPESS


              S37586  ck: 8556  len: 356   ! recombination protein recA - Yersinia pesti

                     IST(G,F,K,Y,R,W)SLSLDIAL(G,F,K,Y,R,W)(A,F,K,Y,R,W)(G,F,K,Y,R,W)(G,
                       IST(G)SLSLDIAL(G)(A)(G)(G)LPM(G)RIVEIY
           41: MDVET   ISTGSLSLDIALGAGGLPMGRIVEIY   GPESS


              S31481  ck: 7629  len: 354   ! recombination protein recA - Enterobacter a

1                    IST(G,F,K,Y,R,W)SLSLDIAL(G,F,K,Y,R,W)(A,F,K,Y,R,W)(G,F,K,Y,R,W)(G,
                       IST(G)SLSLDIAL(G)(A)(G)(G)LPM(G)RIVEIY
           41: MDVET   ISTGSLSLDIALGAGGLPMGRIVEIY   GPESS


 Databases searched:
        NBRF, Release 62.0, Released on 30Sep1999, Formatted on 26Oct1999

      Total finds:          3
    Total length: 47,169,319
 Total sequences:    142,080
        CPU time:   03:22.76

!!AA_SEQUENCE 1.0
P1;RQECA - recombination protein recA - Escherichia coli
N;Alternate names: recombinase A
C;Species: Escherichia coli
C;Date: 31-Jul-1980 #sequence_revision 14-Nov-1997 #text_change 16-Jul-1999
C;Accession: G65049; A93847; A93846; S11931; S63525; S69129; S63979; A03548
R;Blattner, F.R.; Plunkett III, G.; Bloch, C.A.; Perna, N.T.; Burland, V.;
 Riley, M.; Collado-Vides, J.; Glasner, J.D.; Rode, C.K.; Mayhew, G.F.; Gregor,
 J.; Davis, N.W.; Kirkpatrick, H.A.; Goeden, M.A.; Rose, D.J.; Mau, B.; Shao, Y.
 Science 277, 1453-1462, 1997
A;Title: The complete genome sequence of Escherichia coli K-12.
A;Reference number: A64720; MUID:97426617
A;Accession: G65049
A;Status: nucleic acid sequence not shown; translation not shown
A;Molecule type: DNA
A;Residues: 1-353 <BLAT>
A;Cross-references: GB:AE000354; GB:U00096; NID:g2367149; PIDN:AAC75741.1;
 PID:g1789051; UWGP:b2699
A;Experimental source: strain K-12, substrain MG1655
R;Horii, T.; Ogawa, T.; Ogawa, H.
Proc. Natl. Acad. Sci. U.S.A. 77, 313-317, 1980
A;Title: Organization of the recA gene of Escherichia coli.
A;Reference number: A93847; MUID:80145618
A;Accession: A93847
A;Molecule type: DNA
A;Residues: 2-353 <HOR>
A;Cross-references: GB:V00328; NID:g42672; PIDN:CAA23618.1; PID:g42673
R;Sancar, A.; Stachelek, C.; Konigsberg, W.; Rupp, W.D.
Proc. Natl. Acad. Sci. U.S.A. 77, 2611-2615, 1980
A;Title: Sequences of the recA gene and protein.
A;Reference number: A93846; MUID:80234673
A;Accession: A93846
A;Molecule type: DNA
A;Residues: 2-353 <SAN>
A;Cross-references: GB:V00328; GB:J01672; NID:g42672; PIDN:CAA23618.1;
 PID:g42673
R;Zhao, X.J.; McEntee, K.
Mol. Gen. Genet. 222, 369-376, 1990
A;Title: DNA sequence analysis of the recA genes from Proteus vulgaris, Erwinia
 carotovora, Shigella flexneri and Escherichia coli B/r.
A;Reference number: S11931; MUID:91109725
A;Accession: S11931
A;Molecule type: DNA
A;Residues: 2-353 <ZHA>
A;Cross-references: GB:X55552; NID:g42678
A;Note: this ORF is not annotated in GenBank entry ECRECAGEN, release 109.0
R;Morimatsu, K.; Horii, T.
Eur. J. Biochem. 234, 695-705, 1995
A;Title: DNA-binding surface of RecA protein. Photochemical cross-linking of
 the first DNA binding site on RecA filament.
A;Reference number: S63525; MUID:96096752
A;Accession: S63525
A;Status: preliminary
A;Molecule type: protein
A;Residues: 65-69;90-97;179-184;200-207;258-265;304-311;323-331 <MOR1>
R;Morimatsu, K.; Horii, T.
Eur. J. Biochem. 228, 772-778, 1995
A;Title: The DNA-binding site of the RecA protein. Photochemical cross-linking
 of Tyr103 to single-stranded DNA.
A;Reference number: S69129; MUID:95255284
A;Accession: S69129
A;Status: preliminary
A;Molecule type: protein
A;Residues: 90-108,180-184 <MOR2>
R;Gardner, R.V.; Voloshin, O.N.; Camerini-Otero, R.D.
Eur. J. Biochem. 233, 419-425, 1995
A;Title: The identification of the single-stranded DNA-binding domain of the
 Escherichia coli RecA protein.
A;Reference number: S63979; MUID:96067680
A;Accession: S63979
A;Molecule type: protein
A;Residues: 'XX',187-190,192-194 <GAR>
R;Yu, X.; Egelman, E.H.
submitted to the Brookhaven Protein Data Bank, December 1996
A;Reference number: A67277; PDB:2REC
A;Contents: annotation; X-ray crystallography, 2.3 angstroms, residues
 4-157;166-195;211-329
R;Aihara, H.; Ito, Y.; Kurumizaka, H.; Terada, T.; Yokoyama, S.; Shibata, T.
submitted to the Brookhaven Protein Data Bank, January 1997
A;Reference number: A67455; PDB:1AA3
A;Contents: annotation; conformation by (1)H- and (15)N-NMR, residues 269-331
C;Genetics:
A;Gene: recA
A;Map position: 58 min
C;Function:
A;Description: plays an essential role in homologous recombination, in
 induction of the SOS response, and in initiation of stable DNA replication
C;Superfamily: recombination protein recA
C;Keywords: ATP; DNA binding; DNA recombination; DNA repair; P-loop; SOS
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F;67-74/Region: nucleotide-binding motif A (P-loop)
F;141-146/Region: nucleotide-binding motif B
F;73/Binding site: ATP (Lys) #status predicted

   RQECA  Length: 353  April 26, 2000 08:17  Type: P  Check: 9068  ..

       1  MAIDENKQKA LAAALGQIEK QFGKGSIMRL GEDRSMDVET ISTGSLSLDI

      51  ALGAGGLPMG RIVEIYGPES SGKTTLTLQV IAAAQREGKT CAFIDAEHAL

     101  DPIYARKLGV DIDNLLCSQP DTGEQALEIC DALARSGAVD VIVVDSVAAL

     151  TPKAEIEGEI GDSHMGLAAR MMSQAMRKLA GNLKQSNTLL IFINQIRMKI

     201  GVMFGNPETT TGGNALKFYA SVRLDIRRIG AVKEGENVVG SETRVKVVKN

     251  KIAAPFKQAE FQILYGEGIN FYGELVDLGV KEKLIEKAGA WYSYKGEKIG

     301  QGKANATAWL KDNPETAKEI EKKVRELLLS NPNSTPDFSV DDSEGVAETN

     351  EDF
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P1;S37586 - recombination protein recA - Yersinia pestis
N;Alternate names: recombinase A
C;Species: Yersinia pestis
C;Date: 06-Jan-1995 #sequence_revision 06-Jan-1995 #text_change 26-Aug-1999
C;Accession: S37586
R;Kryukov, V.M.; Suchkov, I.Y.; Sazykin, I.S.; Mishankin, B.N.
submitted to the EMBL Data Library, October 1993
A;Description: Complete nucleotide sequence of Yersinia pestis recA gene.
A;Reference number: S37586
A;Accession: S37586
A;Status: preliminary
A;Molecule type: DNA
A;Residues: 1-356 <KRY>
A;Cross-references: EMBL:X75336; NID:g406793; PIDN:CAA53084.1; PID:g406794
C;Genetics:
A;Gene: recA
C;Superfamily: recombination protein recA
C;Keywords: ATP; DNA binding; DNA recombination; DNA repair; P-loop; SOS
 response
F;67-74/Region: nucleotide-binding motif A (P-loop)
F;141-146/Region: nucleotide-binding motif B
F;73/Binding site: ATP (Lys) #status predicted

  S37586  Length: 356  April 26, 2000 08:17  Type: P  Check: 8556  ..

      1  MAIDENKQKA LAAALGQIEK QFGKGSIMRL GEDRSMDVET ISTGSLSLDI

     51  ALGAGGLPMG RIVEIYGPES SGKTTLTLQV IAAAQREGKT CAFIDAEHAL

    101  DPIYAKKLGV DIDNLLCSQP DTGEQALEIC DALTRSGAVD VIIVDSVAAL

    151  TPKAEIEGEI GDSHMGLAAR MMSQAMRKLA GNLKNANTLL IFINQIRMKI

    201  GVMFGNPETT TGGNALKFYA SVRLDIRRIG AVKDGDVVVG SETRVKVVKN

    251  KIAAPFKQAE FQILYGEGIN INGELVDLGV KLKLIEKAGA WYSYYGDKIG

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    351  ETNEEF

!!AA_SEQUENCE 1.0
P1;S31481 - recombination protein recA - Enterobacter agglomerans
N;Alternate names: recombinase A
C;Species: Enterobacter agglomerans
C;Date: 13-Jan-1995 #sequence_revision 13-Jan-1995 #text_change 26-Aug-1999
C;Accession: S31481
R;Rappold, C.S.J.; Klingmueller, W.
submitted to the EMBL Data Library, January 1993
A;Description: Cloning and sequencing of the recA gene from Enterobacter
 agglomerans 339.
A;Reference number: S31480
A;Accession: S31481
A;Status: preliminary
A;Molecule type: DNA
A;Residues: 1-354 <RAP>
A;Cross-references: GB:L03291; EMBL:Z19517; NID:g1209306; PIDN:AAA91766.1;
 PID:g1209308
C;Genetics:
A;Gene: recA
C;Superfamily: recombination protein recA
C;Keywords: ATP; DNA binding; DNA recombination; DNA repair; P-loop; SOS
 response
F;67-74/Region: nucleotide-binding motif A (P-loop)
F;141-146/Region: nucleotide-binding motif B
F;73/Binding site: ATP (Lys) #status predicted

  S31481  Length: 354  April 26, 2000 08:17  Type: P  Check: 7629  ..

      1  MAIDENKQKA LAAALGQIEK QFGKGSIMRL GEDRSMDVET ISTGSLSLDI

     51  ALGAGGLPMG RIVEIYGPES SGKTTLTLQV IAAAQREGKT CAFIDAEHAL

    101  DPIYAKKLGV DIDNLLCSQP DTGEQALEIC DALTRSGAVD VIIVDSVAAL

    151  TPKAEIEGEI GDSHMGLAAR MMSQAMRKLA GNLKNANTLL IFINQIRMKI

    201  GVMFGNPETT TGGNALKFYA SVRLDIRRIG AIKEGDVVVG SETRVKVVKN

    251  KIAAPFKQAE FQILYGEGIN INGELIDLGV KHKLIEKAGA WYSYNGEKIG

    301  QGKANSCNYL KENPKVAAEL DKKLRDMLLS GTGELSVATT AEDADDNMET

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! FINDPATTERNS on PIR:* allowing 0 mismatches

!       1 (I,W,Y,F,H)S(T,W,Y,F,H)G(S,W,Y,F,H)LSLDI(A,W,Y,F,H)LGAGG(L,W,Y,F,H)PMGRIVEIY


              RQECA  ck: 9068  len: 353   ! recombination protein recA - Escherichia co

1                    (I,W,Y,F,H)S(T,W,Y,F,H)G(S,W,Y,F,H)LSLDI(A,W,Y,F,H)LGAGG(L,W,Y,F,H
                                           (I)S(T)G(S)LSLDI(A)LGAGG(L)PMGRIVEIY
           41: MDVET                            ISTGSLSLDIALGAGGLPMGRIVEIY


              S37586  ck: 8556  len: 356   ! recombination protein recA - Yersinia pesti

                     (I,W,Y,F,H)S(T,W,Y,F,H)G(S,W,Y,F,H)LSLDI(A,W,Y,F,H)LGAGG(L,W,Y,F,H
                                           (I)S(T)G(S)LSLDI(A)LGAGG(L)PMGRIVEIY
           41: MDVET                            ISTGSLSLDIALGAGGLPMGRIVEIY


              S31481  ck: 7629  len: 354   ! recombination protein recA - Enterobacter a

1                    (I,W,Y,F,H)S(T,W,Y,F,H)G(S,W,Y,F,H)LSLDI(A,W,Y,F,H)LGAGG(L,W,Y,F,H
                                           (I)S(T)G(S)LSLDI(A)LGAGG(L)PMGRIVEIY
           41: MDVET                            ISTGSLSLDIALGAGGLPMGRIVEIY


 Databases searched:
        NBRF, Release 62.0, Released on 30Sep1999, Formatted on 26Oct1999

     Total finds:          3
    Total length: 47,169,319
 Total sequences:    142,080
        CPU time:   06:57.36

!!AA_SEQUENCE 1.0
P1;RQECA - recombination protein recA - Escherichia coli
N;Alternate names: recombinase A
C;Species: Escherichia coli
C;Date: 31-Jul-1980 #sequence_revision 14-Nov-1997 #text_change 16-Jul-1999
C;Accession: G65049; A93847; A93846; S11931; S63525; S69129; S63979; A03548
R;Blattner, F.R.; Plunkett III, G.; Bloch, C.A.; Perna, N.T.; Burland, V.;
 Riley, M.; Collado-Vides, J.; Glasner, J.D.; Rode, C.K.; Mayhew, G.F.; Gregor,
 J.; Davis, N.W.; Kirkpatrick, H.A.; Goeden, M.A.; Rose, D.J.; Mau, B.; Shao, Y.
Science 277, 1453-1462, 1997
A;Title: The complete genome sequence of Escherichia coli K-12.
A;Reference number: A64720; MUID:97426617
A;Accession: G65049
A;Status: nucleic acid sequence not shown; translation not shown
A;Molecule type: DNA
A;Residues: 1-353 <BLAT>
A;Cross-references: GB:AE000354; GB:U00096; NID:g2367149; PIDN:AAC75741.1;
 PID:g1789051; UWGP:b2699
A;Experimental source: strain K-12, substrain MG1655
R;Horii, T.; Ogawa, T.; Ogawa, H.
Proc. Natl. Acad. Sci. U.S.A. 77, 313-317, 1980
A;Title: Organization of the recA gene of Escherichia coli.
A;Reference number: A93847; MUID:80145618
A;Accession: A93847
A;Molecule type: DNA
A;Residues: 2-353 <HOR>
A;Cross-references: GB:V00328; NID:g42672; PIDN:CAA23618.1; PID:g42673
R;Sancar, A.; Stachelek, C.; Konigsberg, W.; Rupp, W.D.
Proc. Natl. Acad. Sci. U.S.A. 77, 2611-2615, 1980
A;Title: Sequences of the recA gene and protein.
A;Reference number: A93846; MUID:80234673
A;Accession: A93846
A;Molecule type: DNA
A;Residues: 2-353 <SAN>
A;Cross-references: GB:V00328; GB:J01672; NID:g42672; PIDN:CAA23618.1;
 PID:g42673
R;Zhao, X.J.; McEntee, K.
Mol. Gen. Genet. 222, 369-376, 1990
A;Title: DNA sequence analysis of the recA genes from Proteus vulgaris, Erwinia
 carotovora, Shigella flexneri and Escherichia coli B/r.
A;Reference number: S11931; MUID:91109725
A;Accession: S11931
A;Molecule type: DNA
A;Residues: 2-353 <ZHA>
A;Cross-references: GB:X55552; NID:g42678
A;Note: this ORF is not annotated in GenBank entry ECRECAGEN, release 109.0
R;Morimatsu, K.; Horii, T.
Eur. J. Biochem. 234, 695-705, 1995
A;Title: DNA-binding surface of RecA protein. Photochemical cross-linking of
 the first DNA binding site on RecA filament.
A;Reference number: S63525; MUID:96096752
A;Accession: S63525
A;Status: preliminary
A;Molecule type: protein
A;Residues: 65-69;90-97;179-184;200-207;258-265;304-311;323-331 <MOR1>
R;Morimatsu, K.; Horii, T.
Eur. J. Biochem. 228, 772-778, 1995
A;Title: The DNA-binding site of the RecA protein. Photochemical cross-linking
 of Tyr103 to single-stranded DNA.
A;Reference number: S69129; MUID:95255284
A;Accession: S69129
A;Status: preliminary
A;Molecule type: protein
A;Residues: 90-108,180-184 <MOR2>
R;Gardner, R.V.; Voloshin, O.N.; Camerini-Otero, R.D.
Eur. J. Biochem. 233, 419-425, 1995
A;Title: The identification of the single-stranded DNA-binding domain of the
 Escherichia coli RecA protein.
A;Reference number: S63979; MUID:96067680
A;Accession: S63979
A;Molecule type: protein
A;Residues: 'XX',187-190,192-194 <GAR>
R;Yu, X.; Egelman, E.H.
submitted to the Brookhaven Protein Data Bank, December 1996
A;Reference number: A67277; PDB:2REC
A;Contents: annotation; X-ray crystallography, 2.3 angstroms, residues
 4-157;166-195;211-329
R;Aihara, H.; Ito, Y.; Kurumizaka, H.; Terada, T.; Yokoyama, S.; Shibata, T.
submitted to the Brookhaven Protein Data Bank, January 1997
A;Reference number: A67455; PDB:1AA3
A;Contents: annotation; conformation by (1)H- and (15)N-NMR, residues 269-331
C;Genetics:
A;Gene: recA
A;Map position: 58 min
C;Function:
A;Description: plays an essential role in homologous recombination, in
 induction of the SOS response, and in initiation of stable DNA replication
C;Superfamily: recombination protein recA
C;Keywords: ATP; DNA binding; DNA recombination; DNA repair; P-loop; SOS
 response
F;67-74/Region: nucleotide-binding motif A (P-loop)
F;141-146/Region: nucleotide-binding motif B
F;73/Binding site: ATP (Lys) #status predicted

   RQECA  Length: 353  April 26, 2000 08:18  Type: P  Check: 9068  ..

     1  MAIDENKQKA LAAALGQIEK QFGKGSIMRL GEDRSMDVET ISTGSLSLDI

    51  ALGAGGLPMG RIVEIYGPES SGKTTLTLQV IAAAQREGKT CAFIDAEHAL

   101  DPIYARKLGV DIDNLLCSQP DTGEQALEIC DALARSGAVD VIVVDSVAAL

   151  TPKAEIEGEI GDSHMGLAAR MMSQAMRKLA GNLKQSNTLL IFINQIRMKI

   201  GVMFGNPETT TGGNALKFYA SVRLDIRRIG AVKEGENVVG SETRVKVVKN

   251  KIAAPFKQAE FQILYGEGIN FYGELVDLGV KEKLIEKAGA WYSYKGEKIG

   301  QGKANATAWL KDNPETAKEI EKKVRELLLS NPNSTPDFSV DDSEGVAETN

   351  EDF
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!!AA_SEQUENCE 1.0
P1;S37586 - recombination protein recA - Yersinia pestis
N;Alternate names: recombinase A
C;Species: Yersinia pestis
C;Date: 06-Jan-1995 #sequence_revision 06-Jan-1995 #text_change 26-Aug-1999
C;Accession: S37586
R;Kryukov, V.M.; Suchkov, I.Y.; Sazykin, I.S.; Mishankin, B.N.
submitted to the EMBL Data Library, October 1993
A;Description: Complete nucleotide sequence of Yersinia pestis recA gene.
A;Reference number: S37586
A;Accession: S37586
A;Status: preliminary
A;Molecule type: DNA
A;Residues: 1-356 <KRY>
A;Cross-references: EMBL:X75336; NID:g406793; PIDN:CAA53084.1; PID:g406794
C;Genetics:
A;Gene: recA
C;Superfamily: recombination protein recA
C;Keywords: ATP; DNA binding; DNA recombination; DNA repair; P-loop; SOS
 response
F;67-74/Region: nucleotide-binding motif A (P-loop)
F;141-146/Region: nucleotide-binding motif B
F;73/Binding site: ATP (Lys) #status predicted

  S37586  Length: 356  April 26, 2000 08:18  Type: P  Check: 8556  ..

       1  MAIDENKQKA LAAALGQIEK QFGKGSIMRL GEDRSMDVET ISTGSLSLDI

      51  ALGAGGLPMG RIVEIYGPES SGKTTLTLQV IAAAQREGKT CAFIDAEHAL

     101  DPIYAKKLGV DIDNLLCSQP DTGEQALEIC DALTRSGAVD VIIVDSVAAL

     151  TPKAEIEGEI GDSHMGLAAR MMSQAMRKLA GNLKNANTLL IFINQIRMKI

     201  GVMFGNPETT TGGNALKFYA SVRLDIRRIG AVKDGDVVVG SETRVKVVKN

     251  KIAAPFKQAE FQILYGEGIN INGELVDLGV KLKLIEKAGA WYSYYGDKIG

     301  QGKANASNYL KENPANAAEL DKKLREMLLN GGNGEQPVAA ATAEFADGAD

     351  ETNEEF

!!AA_SEQUENCE 1.0
P1;S31481 - recombination protein recA - Enterobacter agglomerans
N;Alternate names: recombinase A
C;Species: Enterobacter agglomerans
C;Date: 13-Jan-1995 #sequence_revision 13-Jan-1995 #text_change 26-Aug-1999
C;Accession: S31481
R;Rappold, C.S.J.; Klingmueller, W.
submitted to the EMBL Data Library, January 1993
A;Description: Cloning and sequencing of the recA gene from Enterobacter
 agglomerans 339.
A;Reference number: S31480
A;Accession: S31481
A;Status: preliminary
A;Molecule type: DNA
A;Residues: 1-354 <RAP>
A;Cross-references: GB:L03291; EMBL:Z19517; NID:g1209306; PIDN:AAA91766.1;
 PID:g1209308
C;Genetics:
A;Gene: recA
C;Superfamily: recombination protein recA
C;Keywords: ATP; DNA binding; DNA recombination; DNA repair; P-loop; SOS
 response
F;67-74/Region: nucleotide-binding motif A (P-loop)
F;141-146/Region: nucleotide-binding motif B
F;73/Binding site: ATP (Lys) #status predicted

  S31481  Length: 354  April 26, 2000 08:18  Type: P  Check: 7629  ..

       1  MAIDENKQKA LAAALGQIEK QFGKGSIMRL GEDRSMDVET ISTGSLSLDI

      51  ALGAGGLPMG RIVEIYGPES SGKTTLTLQV IAAAQREGKT CAFIDAEHAL

     101  DPIYAKKLGV DIDNLLCSQP DTGEQALEIC DALTRSGAVD VIIVDSVAAL

     151  TPKAEIEGEI GDSHMGLAAR MMSQAMRKLA GNLKNANTLL IFINQIRMKI

     201  GVMFGNPETT TGGNALKFYA SVRLDIRRIG AIKEGDVVVG SETRVKVVKN

     251  KIAAPFKQAE FQILYGEGIN INGELIDLGV KHKLIEKAGA WYSYNGEKIG

     301  QGKANSCNYL KENPKVAAEL DKKLRDMLLS GTGELSVATT AEDADDNMET

     351  SEEF
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